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All is beautiful? Generality vs. specificity of word usage in visual aesthetics

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ABSTRACT

A central problem in the literature on psychological aesthetics is a lack of precision in terminology regarding the description and measurement of aesthetic impressions. The current research project approached the problem of terminology empirically, by studying people's word usage to describe aesthetic impressions. For eight different object classes that are relevant in visual aesthetics, including visual art, landscapes, faces and different design classes, we examined which words people use to describe their aesthetic impressions, and which general conceptual dimensions might underlie similarities and differences between the classes. The results show an interplay between generality and specificity in aesthetic word usage. In line with results by Jacobsen, Buchta, Kohler, and Schroger (2004) *beautiful* and *ugly* seem to be the words with most general relevance, but in addition each object class has its own distinct pattern of relevant terms. Multidimensional scaling and correspondence analysis suggest that the most extreme positions in aesthetic word usage for the classes studied are taken by landscapes and geometric shapes and patterns. This research aims to develop a *language of aesthetics* for the visual modality. Such a common vocabulary should facilitate the development of cross-disciplinary models of aesthetics and create a basis for the construction of standardised aesthetic measures.

1. Introduction

1.1. Theoretical background

The field of aesthetics is a booming one — not only in traditionally related fields such as art history and philosophy, but also in psychology ("psychological/empirical aesthetics") and the neurosciences ("neuroaesthetics"). This can be witnessed in a significant number of aesthetics-related publications in the past few years (for overviews on different topics see, e.g., Chatterjee, 2011; Faerber, Leder, Gerger, & Carbon, 2010; Graham & Redies, 2010). Experimental psychology also literally started its systematic research actions in the 19th century with fundamental studies on aesthetics (Fechner, 1876), a fact which underlines the significance of aesthetics for psychology as a field (Wagemans, 2011). Despite this well-documented history of aesthetic research, its interdisciplinary relevance and the steadily growing interest in aesthetic phenomena, the scientific framework of psychological aesthetics still seems to be astonishingly ill-defined. On the one hand, there is a growing number of theoretical approaches to aesthetics and the question how aesthetic experiences can be explained (e.g., Berlyne, 1971; Kreitler & Kreitler, 1972; Leder, Belke, Oeberst, & Augustin, 2004; Ramachandran & Hirstein, 1999; Redies, 2007), but on the other hand, terminology is still rather vague when it comes to describing and assessing aesthetic impressions (Locher, Overbeeke, & Wensveen, 2010).

Let us first have a look at some of the existing definitions for aesthetics or aesthetic phenomena: Baumgarten (2007, originally published in 1750–58), one of the founding fathers of aesthetics as a scientific field (Allesch, 2006), defined *aesthetics* as the science of sensory experience. With respect to the question what makes the mere sensory experience an aesthetic one in our current day understanding, Allesch (2006, p. 8) pointed to "… a certain striking feeling [Betroffenheit] caused by the way in which an … object becomes detached from an everyday context and breaks through the routine of our perceptions and actions" (transl. from German by MDA). This can undoubtedly be the case for experiences of art, but certainly also for other candidate experiences, ranging from impressions of the sublime, e.g., with natural phenomena such as sunsets, to more simple aesthetic impressions of everyday consumer products, such as telephones or tea kettles (e.g., Blijlevens et al., in press; Hekkert, Snelders, & van Wieringen, 2003). The transferability to other domains was also pointed out by Leder et al. (2004), who defined an aesthetic experience as the entirety of cognitive and affective processes involved when examining an artwork, from mere sensory processes to aesthetic judgement and emotion.

For psychologists interested in phenomena of aesthetics, theoretical considerations are doubtlessly of high value, but in order to better understand and especially measure aesthetic experiences he or she

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also needs to know what characterises the aesthetic experience for the viewer. For this purpose, it seems useful to introduce the concept of *aesthetic impressions*. When we speak of aesthetic impressions in the following, we refer to the entirety of affective and cognitive results of an aesthetic experience that are object-related and that can at least theoretically be verbally expressed, i.e. be put into *aesthetic judgements* (see Leder et al., 2004). Object-related means that a general mood state would not be considered an impression, whereas being thrilled by a specific object or the opinion that this object is fascinating would. The idea that aesthetic impressions are verbalisable is a bit more complicated. There are, doubtlessly, a lot of tip-of-the-tongue phenomena in the realm of aesthetics (that is why we put "theoretically" in front of the "verbalisable") and situations where it seems extremely difficult to find what one considers the right expression, but nevertheless it should at least in principle be possible to put the impression into words. This differentiates the concept of aesthetic impressions from physiological symptoms or motor expressions accompanying an emotion and also from *aesthetic emotions* themselves (compare Scherer, 2005). Importantly, an aesthetic experience can comprise a variety of different aesthetic impressions. For example, an artwork like the Mona Lisa might be beautiful, fascinating and disappointing (given its actual size) at the same time.

Apart from the fact that the above-given definitions of aesthetics, aesthetic experiences and aesthetic impressions are only choices from a large body of approaches to the issue (see, e.g., Cupchik, Vartanian, Crawley, & Mikulis, 2009; Markovic, 2010; Scherer, 2005), problems of definition in psychological aesthetics arise especially if one looks for a detailed description and systematization of aesthetic impressions. What different kinds of impressions are there, and how can they be described? The literature on aesthetics seems to be characterised by a great amount of variety in terminology on the one hand and relatively little differentiation on the other hand, which led Armstrong and Detweiler-Bedell (2008, p. 306) to speak of an "inflation of the term beauty". For visual art alone the terms used in the literature to describe aesthetic impressions range from *beauty* (Cela-Conde et al., 2004; Kawabata & Zeki, 2004) over *pleasure* or *pleasingness* (Cupchik & Gebotys, 1990; Locher, Krupinski, Mello-Thoms, & Nodine, 2007), *interest* or *interestingness* (Cupchik & Gebotys, 1990) to terms such as *liking* (Belke, Leder, & Augustin, 2006), *preference* (Vartanian & Goel, 2004), or *aesthetic affect* (Ishai, Fairhall, & Pepperell, 2007). In relatively few cases (e.g. Cupchik & Gebotys, 1990; Jacobsen, Schubotz, Hofel, & von Cramon, 2006) do researchers give explicit reasons why they choose certain variables (Faerber et al., 2010), what the definition of specific terms is, or how certain aesthetically relevant terms are linked with each other. What follows is a confusion of terms, an incommensurability of studies due to differences in word usage or in the worst case even a principled irreplicability of some studies due to a lack of clear definition of aesthetic terms.

To have a more systematic terminology with respect to aesthetic impressions, i.e., to know which different impressions are relevant, what characterises them and how they are interrelated, is yet important to empirical psychologists for at least three reasons: First, it generally helps to refine our understanding of aesthetic experiences, which, despite the great advances mentioned earlier, is still in a relatively early state. Second, knowledge of relevant aesthetic terms and the more abstracts concepts they might denote will also provide researchers with practical suggestions as to which verbal scales might be most relevant or best suitable to examine a particular research question. Very closely related to this second aspect is the third one: A careful choice of terminology and, in consequence, of empirical measures, is crucial to formulate hypotheses clearly and to be able to interpret results. This latter aspect was illustrated by a study by Russell and George (1990), who compared judgements on seven different aesthetic scales. They found that the scales differed not only in the amount of inter-subject agreement but also with respect to how sensitive they were to differences in stimulus material. The authors inferred that "…conclusions drawn from studies using aesthetic scales may depend crucially on the particular scale used" (Russell & George, 1990, p. 15) and that even though some scales, like *likeability*, *pleasingness* and *preferability*, are closely related, they cannot be used interchangeably.

But how to determine which terms are relevant? One, more philosophical, way, is to deduct from theoretical considerations and/or available literature. Although an important approach, it is relatively difficult to apply to the realm of psychological aesthetics, given the little degree of differentiation in terminology mentioned earlier. Moreover, the terms that might seem relevant in a theoretical sense do not always have to overlap with what people actually experience or how they might phrase their experience. This can be due to differences in background and approach between scientist and actual viewer, but also to the fact that language is a highly flexible tool that undergoes permanent change. Thus, an alternative approach to theoretical deduction is to ask people for associations with aesthetics or aesthetic impressions. This approach was taken by Jacobsen et al. (2004), who asked a group of 311 German students to write down adjectives that could be used to describe the aesthetics of objects. *Beautiful* (schön) was by far the most frequently produced word, mentioned by 91.6% of persons, followed by *ugly* (hässlich), which was listed by 42.1% of participants. Other frequently mentioned terms were related to aspects such as prettiness, size, form, grace, disgust, colour or attraction, but all their frequencies lay far below those of *beautiful* and *ugly*. The authors concluded that *beautiful–ugly* is the central dimension of aesthetic impressions.

The study by Jacobsen et al. (2004) represents an important first step towards an empirical exploration of the variety of aesthetic impressions. What it yet does not take into account is that the range of possible "objects" of interest in visual aesthetics — let alone other senses — is vast. For the realm of music, results by Istok et al. (2009) showed that people associated a specific range of words with musical aesthetics, which again pointed to a central importance of the concept of beauty, but, for example, not to a *beautiful–ugly* dimension. The notion of specific word usage for specific domains can also be applied within the field of visual aesthetics alone, where the variety of different object classes ranges from natural stimuli such as landscapes (Purcell & Lamb, 1998) or faces (Chatterjee, Thomas, Smith, & Aguirre, 2009; Olson & Marshuetz, 2005; Roye, Hofel, & Jacobsen, 2008) to visual art (Cupchik et al., 2009; Di Dio, Macaluso, & Rizzolatti, 2007; Hekkert & van Wieringen, 1996; Ishai et al., 2007; Kirk, Skov, Hulme, Christensen, & Zeki, 2009; Locher et al., 2007), design objects (Carbon, 2010; Crilly, Moultrie, & Clarkson, 2004) and other artefacts. Apart from being natural versus man-made, these different object classes vary also in other important aspects, such as their functionality, their social relevance and the frequency of encounter with objects of the class. With respect to criteria underlying aesthetic judgements of the object classes paintings, car interiors, office design and cutlery, Stich, Knauper, Eisermann, and Leder (2007) showed that aesthetic judgements for the different object classes could not be ascribed to the same criterion dimensions. If criteria for what is considered as aesthetic differ between objects, it is very likely to assume that this is also the case for the kinds of aesthetic impression such objects may evoke, even more if object classes span a wider range that also includes natural objects (see also Markovic, 2010).

The current study investigated the problem of generality versus specificity in aesthetic terminology. Following up on the general approach by Jacobsen et al. (2004), we explored people's aesthetic word usage for eight different object classes that are relevant to questions of visual aesthetics: visual art, landscapes, faces, geometric shapes and patterns, cars, clothing, interior design and buildings. Could we support the hypothesis of the general importance of beauty, or would we rather find object class specificity? The rationale to choose the object classes mentioned was to first of all have a broad range of categories that included both natural and man-made objects.

Second, we considered it relevant to include the "classical" visual aesthetic categories art, faces and landscapes as well as a selected number of design classes. For the latter, criteria for inclusion were appearance in studies on visual aesthetics, like in the case of cars (e.g., Carbon & Leder, 2005; Sheller, 2004) and buildings (e.g. Gifford, Hine, Muller-Clemm, & Shaw, 2002), and/or relevance in everyday contexts and environment, as in the case of interior design and clothing. Although a seemingly not very aesthetic category, geometric shapes and patterns were also included, because they allow a high amount of experimental control (Jacobsen & Hofel, 2002) and thus constitute a widely-used stimulus class in empirical aesthetics (Jacobsen et al., 2006). An important class of visual stimuli that was not considered here is websites. The reason for this was that websites differ from the other object classes mentioned with respect to the dynamics of their appearance and supposedly also in the role of user-interface for aesthetic impressions. For current investigations into website aesthetics, we would therefore like to refer to work by colleagues, such as Moshagen and Thielsch (2010).

1.2. Rationale of the current study

The current study approaches the problem of terminology in aesthetics by examining people's aesthetics-related word usage and possible underlying conceptual dimensions for eight different visual object classes. The big aim is to lay the foundation of a *language of aesthetics* for different object classes. We were interested in the following questions: For each of the object classes, which terms do people use to describe their aesthetic impressions of objects of that class? What similarities and differences with respect to word usage do we find between the object classes? And which conceptual dimensions might underlie such similarities and differences? The general idea behind this was to gain information about generality vs. specificity in aesthetic terminology and to provide a basis for future developments of standardised verbal measures in visual aesthetics.

First, we need a short definition of what is meant by generality and specificity in the present research: Generality means that a term is relevant (here: frequently used) either for all object classes studied or at least for a broad subset of these classes, e.g., for all design classes. Specificity, too, can take different forms. On the one hand, it can mean that a term is only frequent for one class or a narrow field of classes, even though it would theoretically be applicable to all of them, irrespective of their nature (e.g., "interesting"). On the other hand, specificity can apply to terms that are only relevant for one specific class due to the nature of the class (like "fast" for cars). Finally, specificity can also arise as a particular combination of relevant terms (including general and specific ones) rather than on single term basis. For our question all three kinds of specificity will be taken into account. Our aim is to get a detailed impression of the "language of aesthetics" for different object classes, and this language includes both terms that allow a direct comparison between classes as well as terms that are only applicable to one class — but nevertheless constitute important aesthetic aspects for this class.

In the present study we asked participants to concentrate on the different object classes and to think of those terms that they would use to describe the aesthetics of objects of the particular class. As we were interested in the facets of experience itself rather than those stimulus characteristics that might give rise to the experience, the emphasis was on terms that participants would use to put aesthetic impressions into words rather than on descriptions of object features that they considered to be aesthetic or not. In contrast to Jacobsen et al. (2004), we did neither impose a restriction in word type (adjectives) nor a time limit. The reason was that we did not want to constrain participants' word usage more than necessary to increase ecological validity as far as possible.

In addition to the questions about word usage stated above, we were interested in two related issues: The first one concerns the affective value of the terms found. It is based on the notion that according to the literature aesthetic experiences have a strongly affective component, e.g. based on a continuous affective evaluation of processing itself (Leder et al., 2004). The questions of relevance here were a) To what extent do the terms found really have "value" (i.e., affective value) in themselves and are not just descriptive?, b) How strong are the valences of frequent terms, especially in comparison to *beautiful*?, and c) To what extent do the object classes studied differ with respect to the affective value of their aesthetic language, and inferred from this, possibly also in the affective strength of the aesthetic impressions they evoke? To answer these questions, we conducted a post study (Post Study 1) that assessed valences for words found in the main study.

The second additional question concerned the similarities between the object classes, rated on an explicit basis. The idea was to exclude that similarities and differences in aesthetic word usage between different classes might simply be based on superficial congruencies in the nature of the classes. To explore this possibility, we conducted a second post study (Post Study 2), which assessed explicit (i.e., general) similarities between the object classes. These were then compared to the similarities and differences in aesthetic word usage.

2. Method

2.1. Main study

2.1.1. Participants

Participants were 178 mother tongue speakers of Dutch (25 men) with an age range of 17 to 36 years (mean age: 18.7 years). From an original sample of 183 persons five persons had to be excluded, due to missing data (3 cases) or because they had a mother tongue other than Dutch (2 cases). Most of the participants (171 cases) were first-year psychology students who participated for course credit, another seven were colleagues from the Department of Psychology of the K.U. Leuven, who volunteered. Being students or university graduates with a medium interest in art ($M = 3.48$, $SD = 1.54$, on a scale from 1 to 7), who on average owned 3.37 ($SD = 10.90$) art books and visited 1.5 ($SD = 1.91$) art exhibitions per year, the sample was regarded as having a generally high level of education, but no specific expertise in art.

2.1.2. Procedure

The study was conducted as an online study, programmed in Java. All student participants took part in the framework of supervised test sessions in a computer room of the K.U. Leuven. The colleagues from the Department of Psychology filled in the study on their personal or work computers. The general instructions were as follows (translation from Dutch):

"In this study we are interested in your language use with respect to different object classes… For each of these object classes we would like to know which terms you would use to describe objects of this class regarding their aesthetics. This is NOT about which features of objects you find aesthetic or not, but about which terms you would use to put the aesthetic impressions such objects leave into words." Participants were asked to imagine a situation in which they would describe aesthetic impressions to friends or acquaintances. They were asked to write down as many terms as came to their mind for each object class and were explicitly encouraged to refer to both positive and negative aesthetic impressions.

The names of the object classes appeared one by one in random order, each together with the question "Which terms would you use to describe your aesthetic impressions of…?" Participants could carry out the study at their own pace. No time or word limit was given.

After finishing the task participants were asked how often a year they visited art exhibitions, how many art books they owned, and how strong they considered their interest in art to be, on a scale

from 1 (*very low*) to 7 (*very high*). Participants needed about 15 min on average to complete the whole study.

2.1.3. Data preprocessing

Given that a few participants had missing data for one of the object classes, the number of datasets available for each object class was as follows: *Visual art* = 177, *interior design* = 173, *landscapes* = 175, *cars* = 177, *clothing* = 175, *geometric shapes and patterns* = 177, *buildings* = 178 and *faces* = 175. In order to avoid uninformative variation in the data due to mere differences in spelling, choice of article or the like and in order to extract the core concepts from people's listings as well as possible, we took the following pre-processing steps:

General steps:

1.) Correction of spelling errors
2.) Extraction of task-related parts from sentences. Example: The sentence *The landscape reaches the horizon and is simply breathtaking* was reduced to *breathtaking*; The phrase *nice furniture that is comfortable and fits well with the interior* was split into *nice*, *comfortable* and *fit*. This was only done for cases in which the separate role of the parts of the phrase or sentence was clear. In contrast, e.g., *beautiful colours* would stay as it was.
3.) Removal of articles for nouns
4.) Removal of qualifiers, such as *sometimes* or *very*. For example, *sometimes beautiful* would become *beautiful*. An exception was made for cases where the qualifier was used to denote an opposite, such as *not abstract*, and for the terms *too big* and *too small* in the case of the *clothing* category, as these were regarded to clearly denote concepts of their own.

Steps taken for the data of each object class:

5.) Pooling of different spellings of the same word (e.g., *chic* and *chique*)
6.) Pooling of singulars and plurals of the same noun
7.) Pooling of words that have the same stem and are synonyms, such as *sportauto* and *sportcar* (both stand for *sports car*), *fotografie* and *foto* (for *photography*/*photograph*) or *bijpassend* and *passend* (both stand for *suitable*)
8.) Pooling of noun and corresponding adjective, such as *harmonie* and *harmonieus* (for *harmony* and *harmonious*, resp.) or *natuur* and *natuurlijk* (for *nature* and *natural*, resp.).

If several terms were collapsed into one, the term chosen was that with the highest frequency, or, in case of equal frequencies, the more coherent one (e.g., when collapsing singular and plural, *colour* would be more logical for a car, whereas *colours* would be more logical for an artwork).

2.2. Post study 1: Valence ratings

2.2.1. Participants

Participants were 30 psychology students with Dutch as mother tongue and an age range between 18 and 23 years (13 men, mean age = 18.8 years). The data of two persons from an original sample of 32 had to be neglected due to response bias (same response in more than 50% of cases). Due to technical problems the data for visual art were missing in three cases, which resulted in 27 datasets for visual art and 30 datasets for all other object classes.

2.2.2. Procedure

Participants received a questionnaire which for each object class included the terms that had been mentioned by at least two participants in the Main Study. There were four different pseudo-randomised versions of the questionnaire, which differed in the order of the object classes as well as in the order of terms for each object class. The participants' task was to rate the valence of each term on a scale from −3 (*very negative*) to 3 (*very positive*), with 0 representing the neutral midpoint.

2.3. Post study 2: Explicit similarities between object classes

2.3.1. Participants

Participants were 16 mother tongue speakers of Dutch with a variety of backgrounds, including students, teachers and civil servants. The age range was 17 to 59 years (8 men, mean age = 33.8 years). None of the participants had special training in art or art history.

2.3.2. Procedure

Participants received a questionnaire in which all 28 pairs of the 8 object classes were listed. There were four different pseudo-randomised orders of the pairs (including pseudo-randomisation of left-right-position within pair). For each pair, participants were asked to judge the similarity of the two object classes on a scale from 1(*very different*) to 7 (*very similar*). They were instructed to refer to similarity in a general sense and did not receive any information about a possible relation to aesthetics.

3. Results

We analysed our data regarding five research questions: 1) Are there general differences between the object classes in the number of terms produced, the variability of terms and the relation to general word frequencies in Dutch? 2) How can the aesthetic word usage for each object class be described in detail, and to what extent do we find signs of generality and specificity? 3) How much affective value (valences) do the terms frequently produced have, and does that differ between the object classes? 4) How similar or different is aesthetic word usage between the classes, and to what extent can that be attributed to explicit similarities of the object classes?, and 5) What might be the conceptual dimensions underlying aesthetic word usage for the classes studied?

Since answering these questions entails a number of very different analyses, we subdivided the results section into five subsections to optimise ease of reading. Each section is dedicated to one of the questions stated above and is followed by a short discussion. An overall synthesis and reflection of the results is presented in the General discussion (Section 4).

3.1. General measures of similarity and difference in aesthetic word usage: number of terms mentioned, variability, and relation to general word frequencies

3.1.1. Results general measures

On average, participants wrote down 5.0 terms per category ($SD = 2.4$). Fig. 1 shows the total number of terms as well as the number of different terms among these for each of the eight different object classes.

A chi-square test showed the total number of terms to differ significantly over categories, $\chi^2(7) = 77.70$, $p < .001$. As suggested by the standardised residuals (see Fig. 1: criterion value |2|), the absolute numbers for faces, clothing and interior design lay above the expected values, while for visual art, patterns and cars they lay below. Thus, participants came up with relatively many terms for faces, clothing and interior design and were less fluent, i.e., produced relatively few terms, for visual art, geometric shapes and patterns and cars. To get an impression of how differentiated word usage was, we had a look at the proportion of different terms among the total number of terms mentioned, which we labelled the *differentiation index*. The higher this index, the lower the homogeneity, or, the other way around, the greater the differentiation in word usage. The index amounted to 42.0% for visual art, 36.3% for faces and lay between

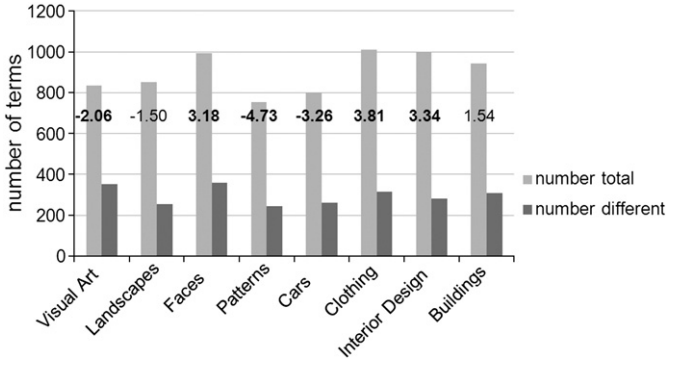

Fig. 1. Total number of terms (light grey) and number of different terms among these (dark grey) for each of the eight object classes studied. Numbers on the light grey bars stand for the standardised residuals as a measure of divergence of the absolute number of terms from the expected value, i.e., from the mean over all classes. Absolute values above 2 are considered significant (indicated by bold typeface).

28.3% and 32.8% for the other object classes. Yet, a chi-square test showed no general differences between the classes.

All the following analyses were related to the wording and meaning of the listed terms rather than to numbers per se. Thus, we will only consider those terms for each category that were mentioned by at least two persons. This is to avoid processing of terms that might be too idiosyncratic or were not part of the active vocabulary in Dutch (see Sutrop, 2001).

Correlations with general word frequency in Dutch were calculated on the basis of the SUBTLEX-NL database (Keuleers, Brysbaert, & New, 2010), a database of word frequencies based on over 44 million words from film and television subtitles, which has been shown to account for more behavioural variance in lexical decision tasks than the CELEX database (Keuleers et al., 2010). Over all categories, correlation between word frequency in the aesthetics task and word frequency in general language use was $r(518) = .074$ (*n.s.*). Regarding the Pearson correlations for each object class in particular, significant correlations were found for cars ($r(100) = .594$, $p < .001$), buildings ($r(113) = .405$, $p < .001$), landscapes ($r(117) = .410$, $p < .001$) and clothing ($r(134) = .270$, $p < .01$), while for faces ($r(127) = .140$), visual art ($r(119) = .103$), geometric shapes and patterns ($r(91) = .079$) and interior design ($r(113) = -.040$) the correlations were not significant. A statistical comparison of the *Fisher-Z* values of each of these correlations (α-level Bonferroni-adjusted to $\alpha = .05/8 = .00625$) showed that the value for cars was significantly higher than for all other classes except for buildings ($-5.00 \leq Z \leq -2.88$), and that buildings and also landscapes had higher values than interior design ($Z = 3.41$ and 3.50, resp.).

3.1.2. Discussion general measures

The very general first analyses reported above show that the eight object classes under discussion differ with respect to the number of terms produced for each class as well as to the correlation of frequencies of occurrence with "normal" word usage. Regarding the former, it was faces, clothing and interior design for which people produced relatively many terms (i.e., more terms than could be expected when compared to the mean number over classes), while for geometric shapes and patterns, visual art and cars the numbers lay below the expected values. One explanation for this distribution might be the extent to which participants are used to make aesthetics-related statements about objects of a certain class in everyday life. Clothing, faces, and interior design are objects with which most people interact frequently (almost on a daily basis perhaps) and for which they are used to come up with aesthetic judgements and descriptions (e.g., which skirt do they like, whom do they find attractive, do they like the atmosphere of a friend's flat or not). In contrast, visual art and cars probably require an explicit interest in order to be fluent with aesthetic descriptions. For geometric shapes and patterns, a fully artificial category, this is even more obvious. Besides the question how fluent people are in producing aesthetic terms, it is also important to know to what extent they use special vocabulary for this or rather draw upon words used in other situations. This question was examined by an analysis of the correlation of word frequencies found in the present study with general word frequencies in Dutch. First of all, it was obvious that there were high correlations for some of the object classes, but that the overall correlation (terms of all classes collapsed) was comparatively low. This indicates that there were no systematic clusters of frequencies of particular words over classes that would lead to a "spread-out" of correlations, or, in other words, the overall frequency pattern was so heterogeneous that correlations with general word frequency for particular classes would not be reflected over classes. The differences between the classes regarding the relation with general word frequency suggest that the participants used different heuristics of word choice for the different object classes. In particular, it was the word usage for cars that, even though its strength of relation did not differ from that for buildings, seemed to be most related to common language use. What cannot be excluded, certainly, is that the rank order of correlations we obtained might also reflect the extent to which these categories occur in those everyday life situations that are captured by the sources used to determine word frequency (cars, buildings, landscapes, clothing, faces, etc.).

3.2. Word usage in detail: frequency distributions and object class-specific vs. unspecific word usage

3.2.1. Results word usage in detail

In Fig. 2 we plotted the scree plots of the frequencies of terms (see also Istok et al., 2009) for all eight object classes. Visual inspection of the elbow shapes of all eight curves suggested that a cut-off-criterion of 5% to define frequent terms, as was used by Jacobsen et al. (2004), would also be useful in the present case.

To provide a quick overview of generality versus specificity, Table 1 contains the percentages of terms that were frequent for several object classes and Table 2 lists those terms that were frequent for only one particular object class. We compared the words listed in Tables 1 and 2 with two independent verbal translations of the German terms from Jacobsen et al. (2004), done by a bilingual and a professional translator of Dutch with German mother tongue. The concordance between our results and those of Jacobsen et al. (2004) was 39.4% and 36.8%, respectively.

As can be seen in Table 1, *beautiful* and *ugly* are the only terms which appear among the list of frequent terms for all classes. An inspection of the elbow shapes in Fig. 2 furthermore renders information about which words stand out in frequency for each class. Obviously, *beautiful* and *ugly* did not always have the highest frequencies, and for *ugly* this was indeed never the case: There are three object classes that clearly break out of the predominance of *beautiful* in terms of the most frequently listed word: geometric shapes and patterns, interior design and buildings. While for geometric shapes and patterns *round* and *angular* were mentioned most frequently, it was *modern* for interior design and *modern* and *big* for buildings. An analysis of how often each word was mentioned as the first in a category supported this general pattern: For visual art, landscapes, faces, cars and clothing, the word that was most frequently produced first was *beautiful* (22.6, 14.9, 27.4, 15.3 and 23.4% of cases, resp.), while for geometric shapes it were *angular* and *round* (10.7% each), for interior design it was *modern* (13.9%) and for buildings *big* (16.3%). Further inspection of elbows in the frequency diagrams depicted in Fig. 2 provided information which words besides the most frequent one stand out in frequency for each class, i.e., which aesthetic judgements might be very characteristic of the class apart from the most dominant one. For visual art, this applied to

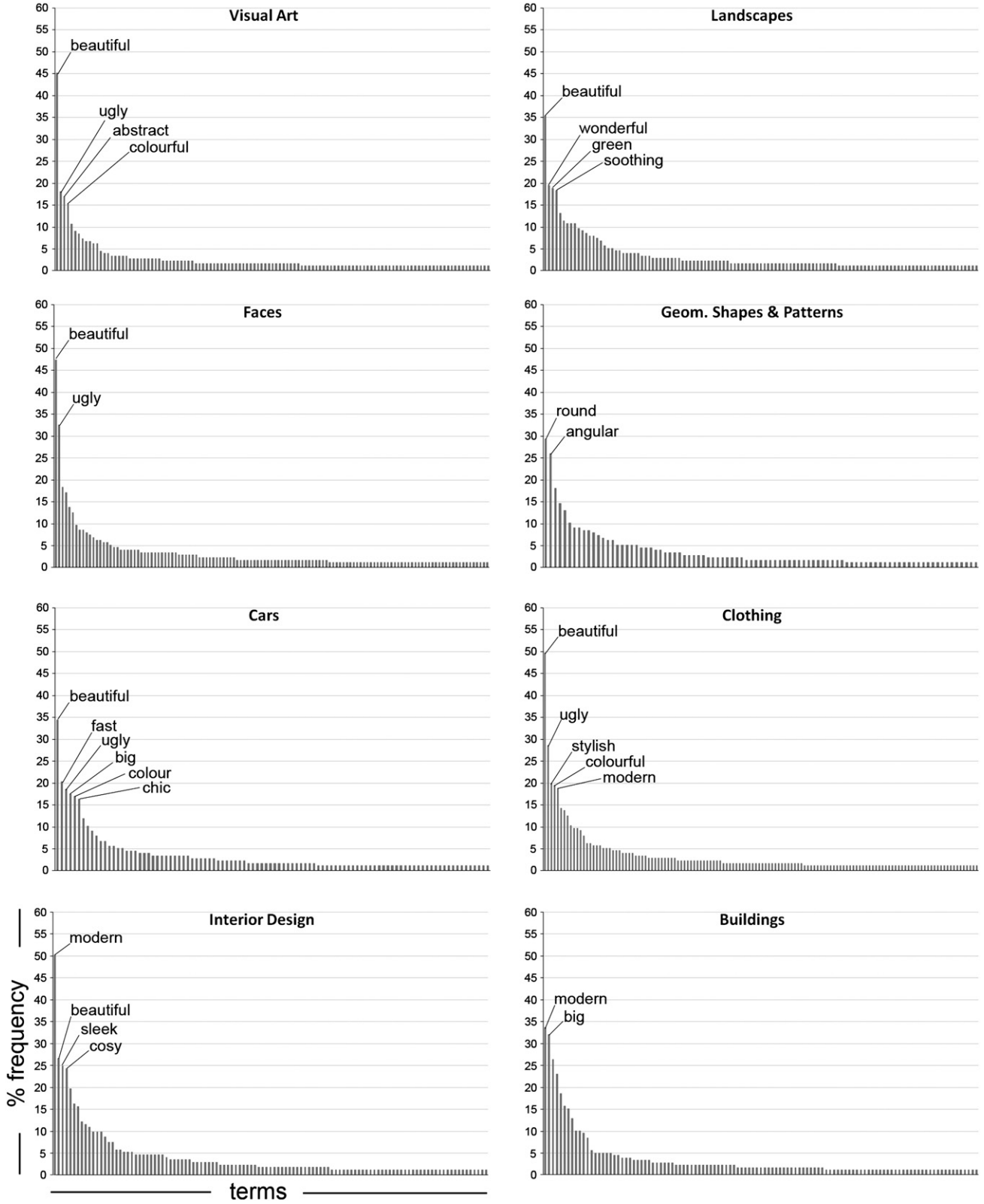

Fig. 2. Scree plots of relative frequencies of terms over persons for each of the eight object classes. The y-axis plots the percentage of persons who mentioned a term for a class, the x-axis plots all terms mentioned for a class in descending frequency order. For exceptional frequencies, that stand out in the scree plot, the respective terms are given.

ugly, *abstract* and *colourful*, for landscapes to *wonderful*, *green* and *soothing*, for cars to *fast*, *ugly*, *big*, *colour* and *chic*, for *clothing* to *ugly*, *stylish*, *colourful* and *modern*, and to *beautiful*, *sleek* and *cosy* for interior design.

3.2.2. Discussion word usage in detail

The analysis of the frequencies with which participants mentioned particular terms for each object class reveals an interplay between general and object-class specific word usage in aesthetics. On the

Table 1
Terms mentioned by at least 5% of participants for more than one of the object classes (English translation with Dutch original in brackets behind). Upper numbers in each cell signify the percentage of participants who listed the term for the particular class. The italic numbers below are the mean ratings of valence (*SD* in brackets) for each term and class, as obtained from Post Study 1. If the valence differs significantly from zero, the number is printed in bold face.

Term	Frequency per object class							
	Visual art	Landscapes	Faces	Patterns	Cars	Clothing	Interior design	Buildings
Beautiful (mooi)	45.2 ***1.44 (1.01)***	35.4 ***1.70 (.75)***	47.4 ***2.10 (.71)***	10.2 ***1.37 (1.33)***	34.5 ***1.77 (.68)***	49.7 ***1.87 (1.04)***	26.6 ***1.87 (.86)***	26.4 ***2.00 (.83)***
Ugly (lelijk)	18.1 ***−1.81 (1.30)***	7.4 ***−2.27 (.69)***	32.6 ***−2.10 (1.00)***	7.9 ***−1.79 (1.32)***	18.6 ***−2.20 (.66)***	28.6 ***−2.27 (.64)***	11.6 ***−2.20 (.76)***	23.0 ***−2.07 (.74)***
Modern (modern)	10.7 ***1.11 (1.34)***	–	–	–	–	18.9 ***1.30 (.84)***	50.3 ***1.17 (1.15)***	33.7 ***1.07 (1.23)***
Sleek (strak)	–	–	–	14.7 ***.87 (1.07)***	7.9 ***1.03 (1.03)***	–	24.9 ***1.13 (.97)***	12.9 ***.73 (1.23)***
Big (groot)	–	–	–	6.2 ***.73 (1.05)***	17.5 ***.80 (1.16)***	–	–	32.0 ***1.03 (.85)***
Colourful (kleurrijk)	15.3 ***1.15 (.91)***	8.0 ***1.53 (.68)***	–	–	–	19.4 ***1.33 (1.16)***	9.8 ***1.17 (.95)***	–
Round (rond)	–	–	17.1 *.13 (1.01)*	29.4 ***.60 (1.07)***	–	–	–	–
Colour/Colours (kleur/kleuren)	9.0 ***0.89 (.97)***	–	–	–	16.9 ***.87 (.86)***	9.7 ***1.07 (1.08)***	8.7 ***1.13 (.90)***	–
Chic (chic/chique)	–	–	–	–	16.4 ***1.33 (1.06)***	13.7 ***1.27 (1.36)***	7.5 ***1.23 (1.10)***	5.1 ***1.30 (1.29)***
Old–fashioned (ouderwets)	–	–	–	–	–	14.3 ***−1.77 (1.01)***	16.2 ***−1.50 (1.28)***	8.4 ***−1.47 (1.33)***
Stylish (stijlvol)	–	–	–	–	6.8 ***1.83 (.59)***	20.0 ***1.57 (.77)***	11.0 ***1.57 (.77)***	–
Classical (klassiek)	–	–	–	–	–	12.6 *.20 (1.52)*	15.6 *.00 (1.29)*	9.6 *.13 (1.25)*
Symmetrical (symmetrisch)	**–**	**–**	18.3 ***.90 (1.09)***	13.0 ***1.17 (.91)***	–	–	–	5.6 ***1.00 (1.29)***
Small (klein)	–	–	–	5.1 ***−.37 (.93)***	11.9 ***−.57 (1.01)***	–	–	15.2 ***−.53 (1.28)***
Old (oud)	–	–	–	–	6.8 ***−1.07 (1.53)***	–	5.2 ***−.70 (1.42)***	15.7 *−.60 (1.65)*
Wonderful (prachtig)	6.8 ***2.04 (.90)***	19.4 ***1.93 (.91)***	–	–	–	–	–	–
Warm (warm)	–	–	–	–	–	6.3 ***1.40 (.89)***	19.7 ***1.80 (.61)***	–
Abstract (abstract)	16.9 ***.63 (1.57)***	–	–	7.3 ***.90 (1.13)***	–	–	–	–
Impressive (indrukwekkend)	7.3 ***1.78 (.64)***	5.1 ***2.03 (.77)***	–	–	–	–	–	10.1 ***1.53 (1.11)***
Cluttered (druk)	–	10.9 ***−.87 (1.20)***	–	–	–	–	7.5 ***−1.07 (1.29)***	–
Special (speciaal)	8.5 ***1.48 (.64)***	–	–	–	–	9.7 ***.87 (1.11)***	–	–
Flat (vlak)	–	10.9 ***.60 (1.00)***		5.1 ***.67 (.76)***	–	–	–	–
Oval (ovaal)	–	–	9.7 *.23 (1.07)*	5.1 *.30 (1.15)*	–	–	–	–
Sportive (sportief)	–	–	–	–	9.6 ***.83 (1.23)***	5.1 ***.50 (1.11)***	–	–
Boring (saai)	6.2 ***−1.96 (.85)***	–	–	–	–	–	5.2 ***−1.73 (.83)***	–

one hand, it supports an important role of *beauty* like Jacobsen et al. (2004) claimed, but on the other hand, it shows that this is clearly only part of the story. *Beautiful* and *ugly* are the only terms that are mentioned frequently for all object classes. Moreover, *beautiful* was the most frequent and obviously also the most salient term (in terms of the high frequency of its appearance as a first word) for visual art, landscapes, faces, cars and clothing. Yet, this did not apply to geometric shapes and patterns, interior design and buildings. Beauty may therefore be the prototypical aesthetic concept for some object classes in visual aesthetics, but not for all — and for none of the classes examined does it seem to be the only important aesthetic concept. The frequency diagrams in Fig. 2 illustrate the pattern of terms mentioned for each of the object classes. For every class, both aesthetic word usage per se and the underlying aesthetic concepts seem to be

Table 2
Terms mentioned by at least 5% of participants for one object class only (English translations of Dutch originals). Numbers in brackets behind each term signify the percentage of participants who listed the term for the particular class. The italic numbers below are the mean ratings of valence (SD in brackets) for each term and class, as obtained from Post Study 1. If the valence differs significantly from zero, the number is printed in bold face.

Visual art	Landscapes	Faces	Patterns	Cars	Clothing	Interior design	Buildings
Interesting (6.8) ***1.52 (0.51)***	Green (18.9) ***1.47 (1.14)***	Sweet (13.7) ***1.80 (1.03)***	Angular (26.0) ***.73 (1.17)***	Fast (20.3) ***1.20 (.100)***	Fashionable (10.3) ***1.23 (1.17)***	Cosy (24.3) ***1.97 (.72)***	High (18.5) ***.80 (1.10)***
Original (6.2) ***1.59 (0.89)***	Soothing (18.3) ***1.97 (.72)***	Good–looking (12.6) ***2.00 (.95)***	Square (18.1) ***.93 (1.05)***	Streamlined (10.2) ***1.20 (.85)***	Trendy (9.1) ***1.67 (1.06)***	Light (12.1) ***1.53 (1.01)***	Imposing (10.1) ***1.20 (1.38)***
	Natural (13.1) ***1.63 (.77)***	Nose (8.6) ***.73 (.64)***	Straight (9.0) ***.97 (.96)***	Tough (5.6) *.33 (1.21)*	Suitable (8.0) ***1.73 (.74)***	Dark (9.8) ***–.93 (1.11)***	Baroque (5.1) *.07 (1.26)*
	Open (11.4) ***1.57 (.73)***	Cute (8.6) ***1.53 (.94)***	Rectangular (9.0) ***.80 (.96)***	Shape (5.6) ***.87 (1.04)***	Elegant (6.3) ***1.43 (1.00)***	Cold (9.8) ***–1.43 (.90)***	Grand (5.1) ***.90 (1.21)***
	Hilly (10.9) ***1.40 (.93)***	Eyes (8.0) ***1.07 (.94)***	Lines (8.5) ***1.00 (1.10)***	Expensive (5.1) *–.07 (1.31)*	Hip (5.7) ***1.30 (.88)***	Disorderly (5.8) ***–1.00 (1.34)***	Windows (5.1) ***1.17 (1.02)***
	Calm (9.7) ***1.57 (.57)***	Slender (7.4) *–.37 (1.25)*	Mathematical (8.5) ***.83 (1.21)***	New (5.1) ***1.30 (.88)***	Nice (5.7) ***1.40 (.93)***	Spacious (5.8) ***1.33 (.88)***	Decayed (5.1) ***–1.63 (1.59)***
	Mountainous (9.1) ***1.33 (1.03)***	Long (6.9) *.03 (1.03)*	Triangle (6.8) ***.70 (.79)***		Sexy (5.7) ***1.77 (.90)***	Sober (5.2) *–.13 (1.25)*	
	Stretched–out (8.6) ***1.50 (.73)***	Thick (6.3) ***–1.50 (1.14)***	Circular (6.2) ***.66 (1.08)***		Casual (5.1) ***1.40 (1.10)***		
	Forested (8.0) ***1.20 (1.06)***	Friendly (6.3) ***2.30 (.70)***	Asymmetrical (5.1) *.17 (1.29)*		Sloppy (5.1) ***–1.33 (1.03)***		
	Breathtaking (6.9) ***2.30 (.70)***	Even (5.7) ***1.43 (.77)***	Ball–shaped (5.1) ***.63 (1.03)***				
	Idyllic (5.7) ***1.83 (.99)***	Mouth (5.7) ***.90 (.80)***					
	Ample (5.1) ***1.17 (.91)***	Beautiful (5.1) ***1.83 (.74)***					

characterised by an interplay of more general aspects, that can be found for several classes, and object-class specific aspects. Terms referring to colour, for example, play a role for all object classes except faces, and references to style (*abstract*, *modern*, *sportive*) can be found for all classes except for the two natural classes faces and landscapes. While terms referring to form are present for several classes (e.g., also *hilly* for landscapes) descriptors of form and symmetry seem to be particularly frequent not only in the case of geometric shapes and patterns, but also in the case of faces. Impressiveness as a concept (as denoted by words like *impressive*, *imposing*, *breathtaking*), on the other hand, plays a role for art, landscapes and buildings. As to object class-specific terminology, word usage for visual art includes several terms that refer to the idea of being special (*special*, *interesting*, *original*), while for landscapes, the aspects of *being natural* and *being soothing* seem to be important facets of aesthetic impressions. In word usage for faces we find several terms that refer to cuteness or prettiness, while the object class-specific words for cars refer with very high frequency to speed (*fast*) and, with lower frequencies, also to status (*expensive*, *new*). In the case of clothing, specific word usage mostly seems to be related to elegance and fashion, while for interior design there is an obvious relevance of the idea of atmosphere, mirrored in the highly frequent term *cosy*, but also in words like *light* or *dark*.

3.3. Valence data: Affective values of the most frequent words

3.3.1. Results valence data

In order to not only get an impression of aesthetic word usage per se, but also of its affective value, we analysed the valence ratings assessed in Post Study 1. The mean valence for the most frequently used terms (see Tables 1 and 2) was slightly but significantly positive, $M = .69$, $SD = .27$; $t(29) = 13.79$, $p < .001$, $d = 3.56$. Obviously, this was not due to stronger positive valences of particular words, but to a higher number of frequent terms with positive valence (79.2%), i.e., with mean values lying generally above zero, as compared to terms with negative valence (20.8%).

Further analyses of the valence data were conducted following three questions (see Section 1.2): a) To what extent do the frequent terms listed in Tables 1 and 2 have affective value in themselves, i.e., to what extent are they positive or negative rather than neutral? This was checked for all terms listed in Tables 1 and 2. b) Are there general differences between the object classes in terms of the valence of their most frequently mentioned words?, and c) Within each object class, to what extent do the words with outstanding frequency differ in valence, and in particular, do they differ from *beautiful*? This analysis focussed only on those terms marked as outstanding in frequency according to the scree plots in Fig. 2 and only on terms with positive valence, due to practical considerations (number of factor levels in an ANOVA and number of words with negative valence, see below).

The second rows for each word in Tables 1 and 2 contain the means and standard deviations of valence ratings obtained in Post Study 1. For each word in each class we conducted a one-sample *t*-test against zero (criterion value: $p < .05$) to test whether its valence significantly differed from neutral. This was the case for all terms apart from *classical* and *oval* for all classes, *slender*, *long* and *round* for faces, *asymmetrical* for patterns, *tough* and *expensive* for cars, *sober* for interior design and *baroque* and *old* for buildings. *T*-values for the significant *t*-tests ranged between −19.4 and 17.9, respectively.

To illustrate general differences in valence between the classes, Fig. 3 shows the mean values of valences for the words mentioned by at least 5% of participants for each of the different object classes (see Tables 1 and 2). Note that the means were based on a different number of terms for the different object classes.

A repeated measures ANOVA with object class as within-subjects variable and mean valence for the most frequently used words as dependent variable revealed a significant main effect of *object class*, $F(1,26) = 23.65$, $p < .001$, $\eta_p^2 = .476$. Analyses of simple main effects showed that the valences of word usage for landscapes were significantly more positive than for other classes (see Table 3). Slightly lower in valence were clothing, visual art and faces, which all three showed a clear contrast to the relatively low valence value for interior design.

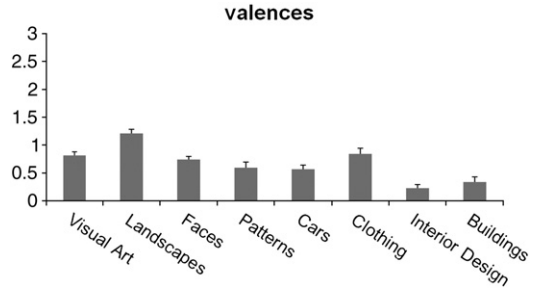

Fig. 3. Mean values of valences (data basis: the 27 participants for whom data for all classes were available) for the most frequent terms for each object class. The scale ranges from −3 (*very negative*) to 3 (*very positive*). Error bars signify standard errors of the mean.

To answer the third question, the comparison of the valence of terms with outstanding frequency to each other and to *beautiful* in particular, we conducted repeated measures analyses of variance on the valence ratings for the (positive) words with outstanding frequency, i.e., the words with positive valence listed in Fig. 2 and *beautiful* (if not in the list with outstanding frequencies, anyway). The analyses were done per object class. A clear effect of *type of judgement* as within-subjects factor, with *beautiful* being the most positive word, was found for buildings ($F(2,58) = 11.57$, $p < .001$, $\eta_p^2 = .285$, *p*s of significant single main effects < .01). For geometric shapes and patterns there was also a main effect of type of judgement, $F(2,58) = 3.68$, $p < .05$, $\eta_p^2 = .113$, with *beautiful* being more positive than *round* ($p < .01$), but not more positive than *angular* ($p = .076$, *n.s.*). In the case of cars, the ANOVA yielded a significant effect of *type of judgement*, too, $F(4,116) = 5.84$, $p < .001$, $\eta_p^2 = .168$. Here analyses of single main effects revealed that *beautiful* was more positive in valence than *big*, *fast* and *colour* (*p*s < .05), but only trend-wise more positive than *chic* ($p = .62$, *n.s.*). Similarly, the main effect of *type of judgement* for clothing, $F(3,87) = 3.26$, $p < .05$, $\eta_p^2 = .101$, could be decomposed in terms of *beautiful* being more positive that *colourful* and *modern* (*p*s < .05), but not more positive than *stylish* ($p = .071$, *n.s.*). For interior design (main effect of *type of judgement*: $F(3,87) = 8.37$, $p < .001$, $\eta_p^2 = .224$) the valences of *beautiful* and *cosy* did not differ significantly from each other. Both were more positive in valence than *modern* and *sleek* (*p*s < .05). Two classes did not show a main effect of *type of judgement* for valence: For visual art, there was a strong trend towards the main effect, $F(2,52) = 3.14$, $p = .052$, $\eta_p^2 = .211$. Analyses of simple main effects suggested that *beautiful* was more positive than *abstract* ($p < .05$), but not more positive than *colourful* ($p = .18$). *Abstract* and *colourful* did not differ in valence. For landscapes the main effect of *type of judgement* was not significant, i.e., *beautiful*, *wonderful*, *green* and *soothing* did not generally differ in valence, $F(3,27) = 2.39$, $p = .074$, *n.s.*

3.3.2. Discussion valence data

The analyses of the valence data support the observation reported by Jacobsen et al. (2004) that when thinking about aesthetic impressions, people tend to come up with positive words rather than negative ones. Furthermore, the results render three important kinds of information: First, they show that nearly all of the frequent terms obtained, apart from few exceptions, have significant valence, i.e., valence that differs from zero. This indicates that the majority of the terms have some affective value, be it positive or negative. If one assumes that aesthetic processing always includes some kind of affective processing (see Leder et al., 2004), this result confirms that, as intended by the instructions given (see Section 1.2), most of the terms found, constitute aesthetic judgements per se rather than descriptions of attributes that could theoretically be linked with aesthetic value. This also holds for words such as *fast* for cars or *green* for landscapes. Second, the analyses of the valences of the frequent terms for each category support the idea of important differences in word usage between the classes, as already discussed in Section 3.1. The terms used for landscapes obviously have the most positive valence. Possibly, this might point to relatively stronger positive aesthetic impressions linked with the experience of landscapes. And third, the comparisons of the valences of the words outstanding in frequency for each of the classes show that most of the terms found not only have affective value per se, but that some of them can definitely rival for strength of positive value with *beautiful*. This was the case for all highly frequent judgements for landscapes, including *wonderful*, *green*, and *soothing*, for *colourful* for visual art, for *cosy* in the case of interior design and for *stylish* in the case of clothing. As for geometric shapes and patterns, *angular* was similar to beautiful in valence, but not *round*.

3.4. Similarity data: Similarities in word usage between different object classes

3.4.1. Results similarity data

Table 1 gives a first impression of the similarities in aesthetic word usage between the eight object classes. We analysed these similarities further by calculating the degree of overlap between the complete datasets (terms used by at least two persons, see above) of each possible pair of object classes. The amount of similarity in word usage was calculated as the proportion of terms shared in relation to all terms mentioned for the two classes. The mean value was 41.5% ($SD = 12.2$). Table 4 contains the values of similarity in word usage for each of the 28 pairs of object classes.

Exceptionally high degrees of similarity were found for *interior design* and *buildings* ($z = 2.25$), while *landscapes* and *geometric shapes and patterns* had the lowest amount of similarity in word usage ($z = -1.72$). To get an impression of the underlying structure of (dis-) similarity relations, all values were subject to ordinal multidimensional scaling analysis (MDS) via the ALSCAL procedure in SPSS, with data dissimilarities (100-data similarity) as raw data. Due to the relatively limited number of object classes in relation to to-be-estimated parameters, we chose a two-dimensional solution. With a value of 1.75, the relation of the number of data points available (28 distance values) to the number of parameters to be estimated

Table 3
Effect sizes (Cohen's *d*) for the pairwise comparisons between object classes based on the simple main effects of the ANOVA on valences. Grey levels serve to illustrate the extent of the effect sizes (the darker, the higher).

	Visual art	Landscapes	Faces	Patterns	Cars	Clothing	Interior design	Buildings
Visual art		1.01	0.27	0.44	0.70	0.05	1.58	1.27
Landscapes	1.01		1.10	1.53	1.60	0.60	2.29	1.57
Faces	0.27	1.10		0.30	0.40	0.25	1.61	0.88
Patterns	0.44	1.53	0.30		0.07	0.36	0.77	0.41
Cars	0.70	1.60	0.40	0.07		0.46	0.86	0.49
Clothing	0.05	0.60	0.25	0.36	0.46		1.46	0.97
Interior design	1.58	2.29	1.61	0.77	0.86	1.46		0.27
Buildings	1.27	1.57	0.88	0.41	0.49	0.97	0.27	

Table 4
Amount of data similarity (proportion of terms shared by two classes among all terms mentioned for the two classes) for all 28 pairs of object classes. Note that terms appearing in different spellings or in singular versus plural for different object classes were combined and counted as the same.

Object class	Object class							
	Visual art	Landscapes	Faces	Patterns	Cars	Clothing	Interior design	Buildings
Visual art								
Landscapes	38.30							
Faces	36.62	26.22						
Patterns	35.19	20.43	44.82					
Cars	40.31	27.11	38.09	41.32				
Clothing	50.80	28.41	34.80	27.62	52.22			
Interior Design	59.27	32.71	28.64	34.13	50.65	63.93		
Buildings	58.25	38.28	37.43	46.60	51.19	49.56	69.10	

(2×8) lay slightly below the proposed value of ≥ 2 (see, Backhaus, Erichson, Plinke, & Weiber, 2003), but S-Stress amounted to .080, which indicated good to satisfactory fit according to Kruskal's norms (Backhaus et al., 2003). Fig. 4 shows the MDS plot.

Dimension 1 contrasts *geometric shapes and patterns* and *faces* on the one side to *landscapes*, *visual art*, *interior design* and *clothing* on the other side. Dimension 2 is characterised by *landscapes* on the one side, and *clothing*, *interior design* and *cars* on the other side. All in all, the two classes with the most distinctive word usage were *landscapes*, on the one hand, and *geometric shapes and patterns* on the other hand.

In order to check to what extent similarities in word usage might be related to general similarities between the object classes we calculated the correlation between the similarities reported above and the explicit similarities assessed in Post Study 2. The correlation amounted to $r=.303$ and was not significant ($p=.117$).

3.4.2. Discussion similarity data

The MDS solution suggests that among the object classes studied here landscapes on the one hand and geometric shapes and patterns on the other hand constitute two relative extremes in aesthetic word usage. First, they are most dissimilar from each other and second they are both clearly detached from the design objects (buildings, interior design, cars, clothing) and visual art, which together constitute a more homogeneous group. In contrast to landscapes, geometric shapes and patterns do not have a completely exceptional position, but as already supposed in the previous section, we find evidence for similarity in relevant terms between geometric shapes and patterns and faces.

An important aspect to note is the lack of a significant correlation between the similarities in aesthetic word usage and the explicit similarities obtained in Post Study 2. This indicates that the similarities and differences in how people describe their aesthetic impressions of different object classes can probably not be explained by how similar these object classes are conceived to be in general. Thus, explicit similarity obviously does not serve as an important heuristic for choice of words in aesthetic descriptions, and differences in aesthetic word usage cannot simply be ascribed to superficial differences between the classes.

3.5. Underlying conceptual dimensions: A first approach

3.5.1. Results conceptual dimensions

The just-described analysis provides evidence regarding the general similarities and differences in aesthetic word usage. In the

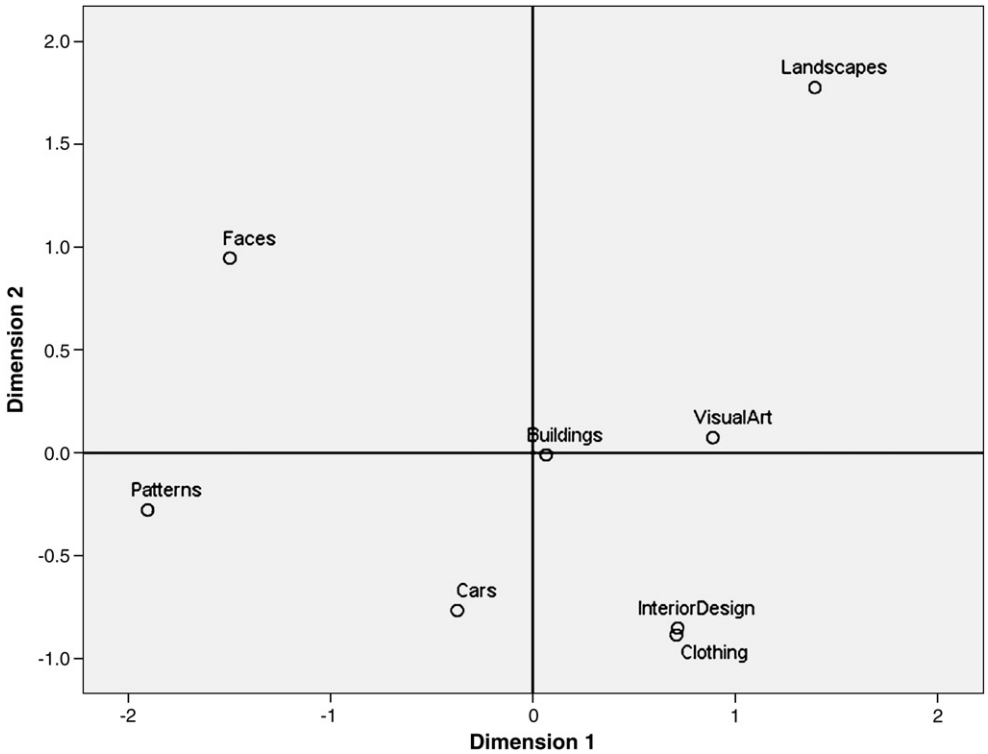

Fig. 4. Two-dimensional ordinal multidimensional scaling solution of the data dissimilarities (100 − (amount of terms shared among all terms mentioned)) between the eight object classes.

following, we aimed to examine the issue of similarities and differences from a different angle, by asking which general conceptual dimensions might underlie word usage for the different object classes. In our interpretation of word frequencies in Discussion 2 we already considered the notion that not all terms found in the Main Study necessarily denote separate concepts, but many of them can probably be regarded as variations (in connotation, intensity etc.) that refer to a smaller number of more general aesthetic concepts. For example, *inventive*, *imaginative*, *creative*, *original* and *new* can probably all be understood as relating to *innovativeness*, whereas *round*, *angular*, *straight* and *rectangular* all refer to the general concept of *form*. In the analysis to follow, we pursued this idea systematically and analysed the data with a view to possible underlying conceptual dimensions. This was done by first organizing the data from all object classes into more general categories, looking for general concepts rather than specificity for a certain object class or differences in intensity, and then submitting the so-classified data to correspondence analysis (CA). The aim was to display the object classes and concepts in a common space to find underlying dimensions.

Collapsed over all object classes the number of different terms was 573. Classification of terms was conducted in two steps. First, two persons with very good knowledge of the data (one of them being the first author) worked independently to classify these 573 terms into larger categories. The two resulting sets were compared and discrepancies discussed among the two raters, such that a single solution could be agreed upon for each reaction. The resulting set of categories was checked for face validity by a third, independent, person, which led to a few minor changes of category membership of single words. The set resulting from this procedure comprised 72 different categories. For practical reasons, i.e., the interpretability of the dimensions in correspondence analysis, these were summarized in a second step, which resulted in 25 final categories. These categories were independent of valence, i.e., could contain both positive and negative manifestations of the same concept, e.g., *symmetrical* and *asymmetrical*. Table 5 lists the final categories and the respective sub-categories included.

The data were recoded with a view to the 25 general categories and were submitted to correspondence analysis, with concept categories as rows and object classes as columns. Based on a scree plot logic, i.e. given the clear break in the amount of variance explained after the first two dimensions, we went for a two-dimensional solution. The solution chosen was symmetrical, since we were foremost interested in the general nature of the dimensions evolving and the relation of object classes and concepts to these dimensions rather than in interpreting differences between particular concepts and object classes.

The total inertia added up to 1.07, $\chi^2(168) = 6109.1$, $p < .001$. The two-dimensional solution explained 53.6% of the total inertia, with Dimension 1 accounting for 27.3% and Dimension 2 for 26.3%. The variation in data that the two dimensions could explain for each of the object classes ranged from 3.4% (for buildings) to 96.9% (for landscapes), with a mean of 48.6%. Fig. 5 shows the CA solution and Table 6 contains the contributions of each object class and concept category to the two dimensions.

Dimension 1. The concept contributing most to this dimension was *naturalness*, which accounted for 35.7% of the variation on this dimension, followed by *peacefulness* (19.6%), and also *atmosphere* (12.1%). The opposite side of Dimension 1 was marked by the concepts of *form* (13.3%) and *symmetry* (5.9%). In terms of object classes, the highest weight on this dimension was taken by *landscapes*, which accounted for 73.3% of the inertia and lay on the same side as the concepts *naturalness* and *peacefulness*. Landscapes were opposed to *geometric shapes and patterns* (17.6%) and *cars* (5.8%). Dimension 1 explained 89.2% of the inertia for the object class *landscapes*. It was also the most dominant dimension for cars, with 17% of the inertia explained.

Table 5
Illustration of data organization for the correspondence analysis (CA): Concept categories used and the smaller sub-categories included.

Concept category used for CA	Sub-categories included
Realism	abstract, realistic
Emotion	aggressive, emotional/expressive, sad, joyful
Form	angular, even, well-formed, round
Symmetry	asymmetrical/skew, symmetrical/structured
Beauty	beautiful, nice, ugly
Size	big, bombastic, small/slim
Elegance	in bad style, classy, elegant, nicely combined
Colour	beautiful colours, colourful, dark, ugly colours, no colour
Interestingness	boring, interesting/fascinating
Complexity	chaotic, complex, simple, with love of detail
Atmosphere	cold/stern, light, tight/oppressive, empty, open
Naturalness	healthy, natural, unnatural
Creativity/Innovativeness	creative/innovative, hip, meaningful
Style	modern, historical/classical, old-fashioned, style
Functionality	fast, functional, good
Distinctiveness	flamboyant, ordinary, special, strange
Sublimity	impressive, overwhelming/moving
Neatness	untended, neat
Provocation	provocative
Peacefulness	peaceful
Pleasantness	pleasant, cosy/comfortable
Prettiness	pretty/sweet
Status	status/image
Content	
Open category	

Dimension 2. The concept explaining most variation (31.6%) on this dimension was *form*, followed by *symmetry* (18.2%). Although explaining much less of the inertia, the concepts with highest loads on the opposite of this dimension were *style* (11.8%) and *elegance* (8.4%). With respect to object classes, it was *geometric shapes and patterns* that contributed most to Dimension 2 (50.4%), which, together with *faces* (8.3%) and *landscapes* (6.6%) was opposed to *clothing* (19.9%) and *interior design* (8.4%). Dimension 2 was the most informative one for geometric shapes and patterns and clothing, accounting for 65.1 and 55.5% of inertia, respectively.

3.5.2. Discussion conceptual dimensions

The results of the correspondence analysis provide some information about which conceptual dimensions might underlie aesthetic impressions for the eight different object classes in our study. What might appear strange at first sight is that *beauty* does not take on a central role in the dimensional solution obtained. Yet, this can be explained by the fact that beauty is a relevant concept for all classes and therefore serves less to differentiate between them. The CA solution provides important evidence about the bigger concepts that play a central role besides beauty.

The first dimension obtained in the CA is most strongly dominated by landscapes in terms of objects and naturalness in terms of concepts and differentiates landscapes from geometric shapes and patterns. Generally, it can be described as naturalness, peacefulness and atmosphere versus form and will be short-labelled *naturalness* vs. *form*. This dimension is particularly important for aesthetic impressions of landscapes. The second dimension is most strongly characterised by geometric shapes and patterns in terms of object classes and form in terms of concepts. It distinguishes form and symmetry from style and geometric shapes and patterns from clothing. This dimension, which is the most important dimension for geometric shapes and patterns, will be referred to in the following as *form* vs. *style*. What has to be kept in mind with respect to the CA solution is that it crucially depends on the system of concept categories used. This means that if the terms mentioned by our participants were classified into different categories, this would probably also entail

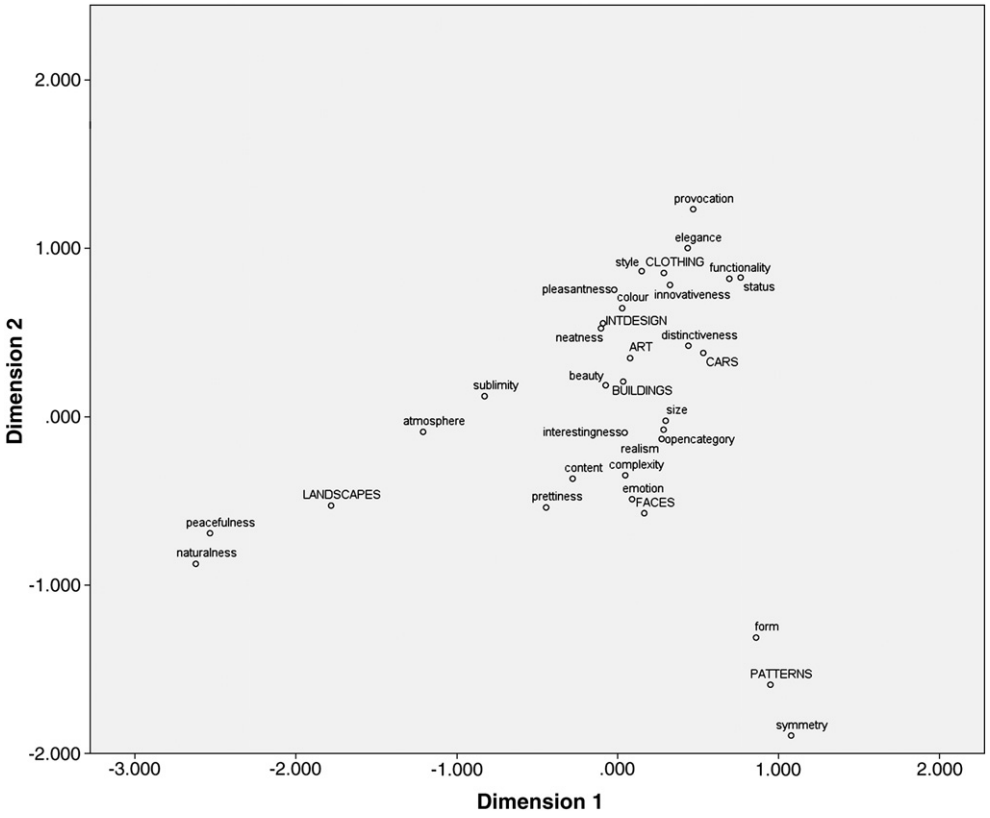

Fig. 5. Solution of the correspondence analysis: Object classes and concept categories in a common two-dimensional space.

Table 6
Contributions of each object class and concept category to the two dimensions of the solution of the correspondence analysis.

Concept	Contributions to dimensions	
	Dimension 1	Dimension 2
Realism	.002	.000
Emotion	.000	.010
Form	.133	.316
Symmetry	.059	.185
Beauty	.002	.010
Size	.009	.000
Elegance	.016	.084
Colour	.000	.039
Interestingness	.000	.000
Complexity	.000	.008
Atmosphere	.121	.001
Naturalness	.357	.040
Creativity/Innovativeness	.008	.045
Style	.003	.118
Functionality	.016	.022
Distinctiveness	.013	.012
Sublimity	.032	.001
Neatness	.000	.008
Provocation	.002	.014
Peacefulness	.196	.015
Pleasantness	.000	.033
Prettiness	.008	.012
Status	.007	.009
Content	.009	.017
Open category	.007	.001
Visual art	.001	.024
Interior design	.002	.084
Landscapes	.733	.066
Cars	.058	.030
Clothing	.022	.199
Patterns	.176	.504
Buildings	.000	.011
Faces	.007	.083

different CA results. Moreover, we limited our analyses to the two most important dimensions in terms of variance explained, and these two are not equally informative for all object classes. In particular, they only explain 3.4% of the inertia for buildings.

On the other hand, there are clear similarities between the CA results and the MDS solution presented earlier. In both cases, landscapes on the one hand and geometric shapes and patterns on the other hand take on the extreme positions on the dimensions found. The fact that we found similar spatial outlines with two different methods cross-validates the general pattern of results.

4. General discussion

The current study addressed the problem of terminology in aesthetics, which equally affects theoretical and empirical psychological approaches to aesthetic phenomena. By examining people's word usage we approached the question which terms might be most relevant and adequate to describe aesthetic impressions. In particular, we were interested to what extent aesthetic word usage might depend on the object class referred to. This is especially important since the range of object classes relevant to research on visual aesthetics is vast and it is quite questionable whether word usage is universal at all (see also Markovic, 2010). What would be the relation between generality and specificity in word usage for different object classes? Could we find support for the “primacy of beauty” that Jacobsen et al. (2004, p. 1253) claimed? And which other concepts besides beauty might play a role in the description of aesthetic impressions? The results were supposed to add systematic knowledge to the relatively confused field of terminology in psychological aesthetics and to provide an important basis for the development of standardised measures to assess aesthetic impressions.

All in all, we found evidence for an interplay between generality and specificity in aesthetic word usage. Regarding general measures of task performance, participants were differently fluent in producing

aesthetic terms for different object classes, as indicated by differences between the object classes regarding the number of terms mentioned. They probably also used different strategies to solve this task, as is suggested by differences in correlation of frequencies with general word frequencies in Dutch. Differences in fluency might be based on differences in the amount of experience with aesthetic judgements for different classes, with objects like faces, clothing or also interior design being a relatively familiar field of aesthetic judgements for many people. As to different strategies, it was the object category cars for which people's aesthetic word usage had most relation to general word usage in Dutch.

The detailed analyses of word usage shed new light on the claim of a primacy of beauty made by Jacobsen et al. (2004). Indeed, the only two words that appeared frequently for all eight object classes were *beautiful* (mooi) and *ugly* (lelijk). A closer look into the data yet revealed that the claimed primacy of beauty was relative and did not apply to all classes: For five of the eight object classes *beautiful* was the most frequent word and also the word most often mentioned first — but not so for geometric shapes and patterns, buildings and interior design, for which *round* and *angular* (geometric shapes an patterns) and *modern* (interior design, buildings) were more salient. This suggests that *beautiful* definitely seems to be a very important aesthetic term and supposedly also denotes an important concept for all of the object classes studied here, but that it is not always the most and primary important term and concept activated when people talk about aesthetics. Furthermore, and perhaps even more importantly, each object class shows its own very distinct pattern of relevant terms. Each such pattern is characterised by an interplay of more general terms, that apply to several object classes, and object class-specific terms, that are only frequent for specific classes. Some important more general terms include *modern* (for most design classes and visual art), *colourful* (for art, landscapes, clothing and interior design), *chic* (for all design classes), *big* (for geometric shapes and patterns, cars and buildings), *symmetrical* (for faces, patterns, buildings) and *impressive* (for visual art, landscapes and buildings). Highly frequent object class-specific terms include *green* and *soothing* for landscapes, *cosy* for interior design, and *fast* for cars. It is important to note that each of the words just mentioned obviously constitutes an aesthetic judgement in itself and not merely a descriptive term that could theoretically be ascribed aesthetic value in a second step. This claim is based on two considerations: First, our instruction stressed that the study was *not* about which features of objects the participants regarded to be aesthetic or not, but about which words they would use to put the aesthetic impressions as such into words, and according to post-experimental debriefing and interviewing we have no empirical indication that our participants behaved otherwise. Second, the valence data collected in Post Study 1 support the assumption that apart from relatively few exceptions (like *oval* or *classical*) all terms frequently mentioned, including terms like *green* for landscapes or *fast* for cars, had a valence significantly different from neutral, so they possess affective value in themselves. If one assumes that affective processing is an essential component of aesthetic processing (e.g., Leder et al., 2004), these observations lend further support to the role of the majority of the terms as self-contained aesthetic judgements. Some of these even have a positive value that is equally strong as that of beautiful, such as *wonderful*, *green* and *soothing* for landscapes or *cosy* for interior design.

Regarding the overall similarities between the object classes, the first thing to notice is that the similarities and differences in aesthetic word usage are not significantly related to explicit similarities between the object classes. This suggests that general similarities between object classes do not serve as an important basis for word choice in aesthetic descriptions. It appears that landscapes and geometric shapes are most extreme in aesthetic word usage, compared to the rest of the object classes studied here. These two have the largest relative aesthetic word usage-dissimilarity, and they are both clearly distinct from visual art and the design classes. The more general concepts that seem to underlie these similarities and differences are naturalness versus form, on the one hand, and style versus form, on the other hand. While landscapes take a completely detached position regarding word usage, geometric shapes and patterns have marked communalities with faces. These communalities seem to be mostly linked to terms that refer to form.

As further analyses of our valence data showed there were also general differences between the object classes regarding the valence of aesthetic word usage. In line with Jacobsen et al. (2004), we found that people, when talking about aesthetics, have a clear tendency to come up with positive rather than negative terms. Just like Bianchi, Savardi, and Kubovy (2011) report a bias towards contraries instead of intermediate states when people are asked about their experience of space, there seems to be a bias towards positive terms when people are asked about their aesthetic impressions. The overall level of positive valence strongly depends on object class. In particular, word usage for landscapes seems to be most positive. Inferring from the words used to the impressions they denote, we suppose that this result may be a hint towards different affective intensities of aesthetic impressions for different object classes, probably including relatively strong positive aesthetic impressions for landscapes.

If one tries to characterise word usage for each of the object classes generally, abstracting from the particular words used, aesthetic word usage for visual art refers to beauty, to colour (see also Augustin & Leder, 2006), to style (compare Wallraven et al., 2009), but also to the idea of being interesting or special (see Faerber et al., 2010). In the case of landscapes, again, *beautiful* seems to be the most dominant term, but what also plays a major role are the concepts of being wonderful, natural, and soothing. The relevance of naturalness fits in with the literature on environmental aesthetics, in which naturalness has turned out to be one of the most powerful factors for preference of different kinds of scenes (Purcell & Lamb, 1998). Our data now suggest that being natural does not only determine aesthetic value, but is an aesthetic value per se — as is being soothing. Apart from references to the particular shape of a landscape, word usage for landscapes, with words like *impressive* or *breathtaking*, furthermore points to the ideas of impressiveness or the sublime, a concept whose relation to beauty has seen a long tradition of discussion in philosophy (e.g., Burke, 1990, originally published in 1757; Kant, 1991, originally published in 1764). In contrast to the relation of terms used in the literature on face aesthetics (761 results for “faces” AND “attractiveness” versus 302 results for “faces” AND “beauty” in the topic search of ISI Web of Knowledge on 25/07/11, Time span = All Years. Databases = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH. Lemmatization = Off), word usage for faces is clearly dominated by *beautiful* too, which appeared far more often than the theoretically “competing” face-relevant term *attractive*. Following *beautiful* are terms referring to form and symmetry, but also to cuteness. The high frequency of terms related to form and symmetry matches the high importance of symmetry mentioned in the literature on facial aesthetics (e.g., Carbon, Gruter, Gruter, Weber, & Lueschow, 2010; Grammer & Thornhill, 1994). It is furthermore a commonality between faces and geometric shapes and patterns. For the latter it is clearly not *beautiful* which is the most frequent word listed, but descriptors of form and symmetry. This is in line with the saliency of symmetry as a characteristic regularity of patterns and shapes, as revealed in the literature on visual perception of shape and on regularity detection (Machilsen, Pauwels, & Wagemans, 2009; van der Helm & Leeuwenberg, 1996; Wagemans, 1995, 1997). The two other examples for which the primacy of beauty does not apply (see above) are buildings, on the one hand, and interior design on the other hand. For interior design word usage is strongly related to style (e.g., *modern*, *old-fashioned*, *classical*), to beauty and to

atmosphere (e.g., *cosy*, *warm*). For buildings stylistic concepts and beauty are also highly relevant but there is also a high frequency of terms that refer to size (*big*, *high*) and the idea of being imposing (*impressive*, *imposing*, *grand*). Word usage for cars is dominated by the ideas of beauty, speed and size, but is also characterised by references to colour, form, elegance, prestige-related aspects (*expensive*, *new*) and sportiness. Beauty again is the central concept for clothing, but in this case it is combined with references to style, elegance, colour, being in fashion and being special.

What are the practical implications of our results regarding the choice of scales in empirical aesthetics? We would suggest that if a researcher is looking for a general aesthetic term that is easily understandable, suitable for a wide range of objects and not tailored for any particular object class, *beautiful* is a good and safe choice, as was also suggested by Jacobsen et al. (2004). The idea of beauty is relevant for all object classes examined here, which supports the notion that it is a very general and very important concept in aesthetics — even if not always the primary one. Yet, if one aims to examine aesthetic impressions of a particular object class and thus aims to grasp what accounts for the aesthetics of this particular kind of objects, *beautiful* will mostly be too general. Some hints as to which terms might be particularly relevant for different kinds of objects have been discussed in detail above.

Future studies should further examine the semantic interrelations between the terms found in this study. The current study is intended to provide a first basis for a "language of aesthetics" for the visual modality. Starting from this basis we can a) determine a more coherent terminology in psychological aesthetics and b) develop standardised verbal measures to assess aesthetic impressions. Regarding the first point, our study very practically illustrates the need and relevance of careful choice of terms in psychological discussions of aesthetic phenomena: Non-scientists and non-experts, i.e., our participants, do use a very multifaceted and highly differentiated language to describe aesthetic impressions — and this should be incentive enough for scientists to do the same and even more, to be as exact in terminology as possible. For this purpose, it seems very useful to examine the exact semantic interrelations of the words found in this study, to find out about similarities and dissimilarities and possible nodes in terms of a semantic network. The idea would be to come to a clustering of terms, similar to the one used for the correspondence analysis above, on the basis of empirical data. Semantic network analysis (e.g., Helbig, 2006) will also be a useful step for the second point, the development of standardised verbal instruments to assess aesthetic impressions in the visual realm. As discussed initially, the problem of terminology in psychological aesthetics is also reflected in a confusion and obvious lack of systematic use of scales in empirical aesthetics. In order to be able to examine aesthetic issues systematically and to keep empirical aesthetics on a par with other fields of psychological research in the long run, standardised measures seem indispensable. We hope that the current study will be basis and kick-off for more systematic research to unravel the field of aesthetic terminology — a field of study that we can promise is definitely modern, very fascinating and, certainly, always beautiful.

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